

Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004

Page 2 of 11

**Amendments to the Claims:**

A listing of the entire set of pending claims (including amendments to the claims, if any) is submitted herewith per 37 CFR 1.121. This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (Currently amended) A liquid crystal display apparatus capable of color-displaying provided with comprising:

a crystal panel having, in each main pixel unit, a red outputting subpixel, a green outputting subpixel, a blue outputting subpixel, and a luminance-intensifying subpixel, and characterized by comprising: data calculating means for obtaining a decoder that is configured to provide a digital value for driving a the luminance-intensifying subpixel by carrying out a predetermined calculation processing using digital values respectively for a red inputting pixel, a green inputting pixel, and a blue inputting pixel which are obtained from an input image,

wherein:

said the liquid crystal displaying apparatus driving the luminance-intensifying subpixel, the red outputting subpixel, the green outputting subpixel and the blue outputting subpixel by using said the digital value for driving said the luminance-intensifying subpixel obtained by said data calculating means the decoder and said the digital values of said the red, green and blue inputting subpixels, characterized in that: and

said the predetermined calculation processing by said data calculating means obtains said the digital value for driving said the luminance-intensifying subpixel by a function of  $W=f(Y_{min}, Y_{max})$  where said the digital value of said the luminance-intensifying pixel is defined as W, and a minimum value and a maximum value of said the digital values of said the red inputting subpixel, said the green inputting subpixel and said the blue inputting subpixel are respectively defined as  $Y_{min}$  and  $Y_{max}$ , and the function  $f(Y_{min}, Y_{max})$  provides an output value that is dependent upon both  $Y_{min}$  and  $Y_{max}$ .

Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004

Page 3 of 11

2. (Currently amended) A liquid crystal display apparatus according to Claim 2 claim 1, wherein said-the function of W=f(Ymin,Ymax) is directed to a function which is monotonously increased that monotonically increases as said-Ymin value or said Ymax value becomes largerincreases.

3. (Canceled)

4. (Currently amended) A liquid crystal display apparatus according to claim 1 characterized in that: when capable of color-displaying comprising:

a crystal panel having, in each main pixel unit, a red outputting subpixel, a green outputting subpixel, a blue outputting subpixel, and a luminance-intensifying subpixel, and

a decoder that is configured to obtain a digital value for driving the luminance-intensifying subpixel by carrying out a predetermined calculation processing using digital values respectively for a red inputting pixel, a green inputting pixel, and a blue inputting pixel which are obtained from an input image,

wherein:

the liquid crystal displaying apparatus driving the luminance-intensifying subpixel, the red outputting subpixel, the green outputting subpixel and the blue outputting subpixel by using the digital value for driving the luminance-intensifying subpixel obtained by the decoder and the digital values of the red, green and blue inputting subpixels, and

the predetermined calculation processing by decoder provides the digital value for driving the luminance-intensifying subpixel by a function of W=f(Ymin,  $\alpha$ ,  $\beta$ , n) where the digital value of the luminance-intensifying pixel is defined as W, and a minimum value of the digital values of the red inputting subpixel, the green inputting subpixel and the blue inputting subpixel is defined as Ymin, and  $\alpha$ ,  $\beta$  and n are predetermined real numbers, at least one of  $\alpha$  and  $\beta$  being non-zero, and when

a maximum value which digital values of said-the red inputting subpixel, said the green inputting subpixel and said-the blue inputting subpixel can take is defined as MAX, and said-the function of W=f(Ymin,  $\alpha$ ,  $\beta$ , n) w=f(Ymin, Ymax) is represented

Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004

Page 4 of 11

by a function of  $W=\text{Max}^*((Y_{\min}+\alpha)/(MAX+\beta))^n$   $W=\text{Max}^*((Y_{\min}+\alpha)+(MAX+\beta))^n$  by which a digital value for driving said luminance intensifying subpixel is obtained.

5. (Canceled)

6. (Currently amended) A liquid crystal display apparatus according to claim 1, further including: characterized in that: said apparatus comprises: storing means for storing a memory that is configured to store a plurality of kinds of functions each represented by said the function of  $W=f(Y_{\min}, Y_{\max})$ ; and selecting means for selecting a selector that is configured to select from among the any of said plurality of kinds of functions represented by said the function of  $W=f(Y_{\min}, Y_{\max})$  stored by said storing means the memory.

7. (Currently amended) A liquid crystal display apparatus according to claim 1, wherein said the red outputting subpixel, said the green outputting subpixel and said the blue outputting subpixel are arranged to form a main pixel unit without using said the luminance-intensifying subpixel for luminance in accordance with a predetermined control signal, thereby to enable the apparatus to be used as a liquid crystal display apparatus capable of color displaying.

8. (Canceled)

9. (New) A liquid crystal display apparatus according to claim 1, wherein the function  $W=f(Y_{\min}, Y_{\max})$  is given as a function  $W=(Y_{\max} \cdot Y_{\min})/\text{MAX}^2$ , where MAX is a maximum value which digital values of the red inputting subpixel, the green inputting subpixel and the blue inputting subpixel can take.

Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004

Page 5 of 11

10. (New) A liquid crystal display apparatus according to claim 9, further including  
a memory that is configured to store at least one other function for determining  
W, and  
a selector that is configured to select among the functions for determining W  
stored by the memory.

11. (New) A liquid crystal display apparatus according to claim 10, wherein  
the at least one other function includes  $W = \text{Max}^* \{ (Y_{\min} + \alpha) / (\text{MAX} + \beta) \}^n$ , where  
MAX is a maximum value which digital values of the red inputting subpixel, the green  
inputting subpixel and the blue inputting subpixel can take.

12. (New) A liquid crystal display apparatus according to claim 9, wherein  
the decoder is further configured to:  
receive a control signal, and  
selectively provide the digital value for driving the luminance-  
intensifying subpixel based on the control signal.

13. (New) A liquid crystal display apparatus according to claim 10, wherein  
the decoder is further configured to:  
receive a control signal, and  
selectively provide the digital value for driving the luminance-  
intensifying subpixel based on the control signal.

14. (New) A liquid crystal display apparatus according to claim 1, further including  
a memory that is configured to store at least one other function for determining  
W, and  
a selector that is configured to select among the functions for determining W  
stored by the memory.

Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004

Page 6 of 11

15. (New) A liquid crystal display apparatus according to claim 14, wherein  
the at least one other function includes  $W=Max^*((Y_{min}+\alpha)/(MAX+\beta))^n$ , where  
MAX is a maximum value which digital values of the red inputting subpixel, the green  
inputting subpixel and the blue inputting subpixel can take.

16. (New) A liquid crystal display apparatus according to claim 1, wherein  
the decoder is further configured to:  
receive a control signal, and  
selectively provide the digital value for driving the luminance-  
Intensifying subpixel based on the control signal.

17. (New) A liquid crystal display apparatus according to claim 4, further including  
a memory that is configured to store at least one other function for determining  
W, and  
a selector that is configured to select among the functions for determining W  
stored by the memory.

18. (New) A liquid crystal display apparatus according to claim 17, wherein  
the at least one other function includes  $W=(Y_{max} \cdot Y_{min})/MAX^2$ .

19. (New) A liquid crystal display apparatus according to claim 18, wherein  
the decoder is further configured to:  
receive a control signal, and  
selectively provide the digital value for driving the luminance-  
Intensifying subpixel based on the control signal.

**Appl. No. 09/889,088  
Amendment and/or Response  
Reply to Office action of 23 March 2004**

**Page 7 of 11**

20. (New) A liquid crystal display apparatus according to claim 17, wherein  
the decoder is further configured to:

receive a control signal, and  
selectively provide the digital value for driving the luminance-  
intensifying subpixel based on the control signal.

21. (New) A liquid crystal display apparatus according to claim 4, wherein  
the decoder is further configured to:

receive a control signal, and  
selectively provide the digital value for driving the luminance-  
intensifying subpixel based on the control signal.